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U.S. Committee on Merchant

Marine and Fisheries.

Statement of Dr. Hugh M. Smith,

on Study of Fish Diseases.

1911



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## STUDY OF FISH DISEASES.

[S. 8123, Sixty-first Congress, second session.]

AN ACT To establish a biological station for the study of fish diseases.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That out of any moneys in the Treasury not otherwise appropriated there is hereby appropriated—*

For the construction and equipment of a biological station, under the direction of the Bureau of Fisheries, for the study of fish diseases and experimental work in the interests of fish culture, at some suitable site to be selected by the Secretary of Commerce and Labor, including purchase of site and the construction of buildings and ponds, forty thousand dollars.

For all necessary expenses in connection with the special study of fish diseases, in the interests of fish culture, ten thousand dollars.

U. S.

COMMITTEE ON MERCHANT MARINE AND FISHERIES,  
HOUSE OF REPRESENTATIVES,

Thursday, January 26, 1911

The committee proceeded to the consideration of S. 8123 at 11.10 o'clock a. m., Hon. William S. Greene (chairman) presiding.

### STATEMENT OF DR. HUGH M. SMITH, DEPUTY AND ACTING COMMISSIONER OF FISHERIES.

The CHAIRMAN. We will now hear from Dr. Smith, representing the Commissioner of Fisheries, on Senate bill 8123.

Dr. SMITH. As the Deputy and Acting Commissioner of Fisheries I have been authorized by Secretary Nagel to appear before this committee and state the position of the department and the Bureau of Fisheries with reference to Senate bill 8123, and I would like to submit a very brief statement on the matter, with your permission.

A subject that is already very important in the fish-cultural work of the Government and is yearly becoming more so is fish diseases. The cultivation of fishes, like the cultivation of domestic animals, predisposes to maladies of various kinds from which wild fishes are practically free.

The Bureau of Fisheries has been obliged to spend considerable time and money in the investigation of more or less serious epidemics affecting young fish and brood stock at our hatcheries, and has been called on repeatedly to render aid to the States in similar emergencies.

With very limited means and facilities, we have achieved considerable success in ascertaining the causes and in suggesting ways to cure and prevent certain troublesome diseases affecting the fishes of the fresh waters that are cultivated in ponds. We have long felt that the situation demands more comprehensive and energetic consideration, and we have been hopeful that Congress would be so impressed with the importance of the matter that adequate facilities would be provided. Congress is most liberal in establishing fish hatcheries in all parts of the country. What is now urgently needed to make the operation of these hatcheries more efficient and more economical is a station established especially for the investigation of practical and passing problems in fish breeding. There is an agricultural experiment station in every State—may there not be one fishery experiment station for the entire country?

The most serious, widespread, and destructive fish disease now receiving attention and demanding the most careful study is malignant tumor, affecting the thyroid gland of the salmons and trouts. This tumor has all the characteristics of cancer, but in order not to unduly alarm the fish-eating public, we prefer to call this affection the throat or thyroid tumor rather than by the dreaded name of cancer. Facts regarding the prevalence of this disease, its ravages in Government and State hatcheries, and the problems that are confronting the fish-culturalist can be presented to the committee by Dr. Gaylord better than by me, as he has been giving special personal attention to this subject for a year or more.

I would like to say that Dr. Gaylord represents the highest perfection of knowledge of the whole subject of cancer. He is the leading specialist on the subject, and we have been very fortunate in securing his services in this great emergency that has recently come up in our work.

In the event of the establishment of this station this fish cancer will be the chief subject for investigation for several years at least. We are hopeful that the disease may soon be eradicated and measures devised for preventing its recurrence.

As long as fish are cultivated, however, there will be some kinds of maladies to combat, and the proposed experiment station will become increasingly useful and necessary with the development and expansion of artificial propagation.

We foresee some very important work that may be done at such a station that can not be undertaken at the ordinary hatchery where every effort is put forth to produce a large output in order to meet the demands that are far in excess of the supply. I have reference to the institution of experiments having for their object the improvement of the food qualities of our fishes. What selective breeding has done for poultry, cattle, horses, and dogs, selective breeding may do for bass, trout, and other fishes; but this is a subject to which as yet no attention whatever has been given owing to lack of facilities. One does not have to be a prophet to be able to predict that it will be possible to produce breeds of fish that will be immune or very resistant to disease, and will have food qualities and size superior to the wild fish.

An aspect of this matter which I think should be brought to the attention of the committee is the very large commercial value of the

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fish eggs, young fish, and brood fish that are imperiled each year by the various epidemics and maladies to which the output of the fresh-water hatcheries is liable. I have been making some calculations based on the market value of our product as determined (1) by the actual cost of manufacture, so to speak, and (2) by the quotations of private individuals engaged in raising fish for sale; and I have arrived at the conclusion that the annual output of the Federal hatcheries alone represents an actual money value of not less than \$1,000,000. This output is imperiled by our inability to handle adequately the diseases that are constantly coming up.

MR. HOBSON. Will you tell us approximately what is the capital invested in the plants that have the output of a million dollars?

DR. SMITH. They are, I believe, 31 hatcheries, whose output is now involved in fish epidemics.

MR. HOBSON. Do they yield the million dollars that you estimate?

DR. SMITH. Those hatcheries do.

MR. HOBSON. And cost approximately \$25,000?

DR. SMITH. Yes.

MR. HOBSON. And then, how much to maintain, on an average, each year?

DR. SMITH. The average personnel of a hatchery costs \$4,500. About that much more, or, in some exceptional cases, twice as much more, is required to operate and maintain, depending altogether on the nature of the work.

MR. GOULDEN. The bureau has been very kind to me in furnishing me with bass and all other fish I needed for a fresh-water pond up in Maryland. Last spring, in April, about 150 or 200 fish, black bass principally, came to the surface and drifted to the shore, dead. Can you give me any explanation of what could have occurred? It must have been some disease. They weighed anywhere from a quarter of a pound up to 4 pounds. It almost depleted the fresh-water pond.

DR. SMITH. There are so many ways that fish can be killed in a wholesale way that it would be impossible for me to make any suggestion.

MR. GOULDEN. It was not the ice, because the ice had disappeared two months before. But there were at least 150 to 200 of them, and it looked to me like a very great pity.

DR. SMITH. I would like to say that we have found that one of the principal causes of disease in basses and trouts that are reared in ponds is bacterial infection. The fishes, owing to the medium in which they live, seem to be particularly liable to diseases of a bacterial nature, and I will illustrate the seriousness of this matter. A few years ago we had at one station a prospective output of a million and a half yearling brook trout, and 1,200,000 of them died in a very short time of an obscure bacterial disease, which we have since been able to study and hope to prevent recurring.

MR. HARDY. Right along the line of what Mr. Goulden was saying, we had a large artificial tank near my home which was stocked for breeding purposes with hickory shad, and for about two years they increased very enormously, until one day after a big rain, all of a sudden when that tank ran over the dam enough to get back to its



level the whole border of it was covered with dead shad, and I do not think there has ever been a shad in it since.

Mr. GOULDEN. I think one of the uses of this proposed experiment station would be to determine, if possible, by investigation the nature of the disease and the remedy. I did not bother the bureau with a complaint in my own case, because I knew you had enough to do without it, and I knew you were not equipped and in shape to take charge of an individual experiment of that character.

Dr. SMITH. I would like to say that the Federal Fisheries Service is looked up to by all the States having fish-cultural work, and that means about three-fourths of them, and whenever any troublesome fishery question arises in a State, or in connection with State fish-cultural work, we are called upon to make a study of it; so that this proposed laboratory would be useful to all the States, as well as to the Federal Government.

I would like to have reproduced in the records of the committee two brief references to this subject that appear in the last report of the Commissioner of Fisheries.

The CHAIRMAN. That can be done.

Dr. SMITH. I have nothing else to say.

Mr. STURGISS. Do you not think you owe it to the public, if it is cancer, to call it cancer?

Dr. SMITH. Until we have gotten a little further along in our work we have not wanted to unduly alarm the people. As a matter of fact, however, the existence of cancer in fish is now pretty well recognized by the public.

Mr. WILSON. Are there not various opinions amongst the medical profession as to whether fish do cause cancer?

Dr. SMITH. I would like for Dr. Gaylord to speak on that point. I think there is some doubt as to whether fish have given cancer to human beings or whether human beings are responsible for cancer in fish. But, in any event, it is a very important problem that ought to be studied.

#### **STATEMENT OF DR. HARVEY R. GAYLORD, DIRECTOR OF THE NEW YORK STATE CANCER LABORATORY, OF BUFFALO, N. Y.**

Dr. GAYLORD. Gentlemen, perhaps you would be interested in knowing the way in which we became interested in this subject, which, at first glance, might appear somewhat foreign to an investigation of cancer in human beings.

The past 13 years comprehends practically all that has been accomplished in modern cancer research, and the advance in cancer investigation we owe almost exclusively to the study of cancer in the lower animals. About 10 years ago the investigation of cancer, which had become a very acute problem before the medical profession, was taken up energetically, and was, fortunately, put upon an experimental basis by the discovery, or the recognition, of the fact that cancer could be transmitted from one animal to another, experimentally, by grafting, by transplantation. That gave us the means of experimenting with cancer. It also attracted our attention to the prevalence of cancer in the lower animals. Out of those observations there came certain very suggestive facts concerning the endemic occurrence of cancer. Our attention has also been called

to the occurrence of cases in certain localities, and, among other things, our attention was attracted to a curious geographical distribution of cancer, which suggested a relationship between cancer and water.

In due course of time that naturally attracted our attention to the question of whether fish, the inhabitants of the water, suffered from cancer and allied diseases as did other animals. There is a marked distinction in the distribution of cancer in animals between the wild and the domesticated. It is true we have nothing like the accurate information regarding wild animals that we have regarding domesticated animals. But from certain significant facts in relation to the distribution of cancer in man, it is pretty well known that civilization has a marked effect upon the incidence of cancer in man, and that domestication of animals has a like effect. So when we came to investigate the question of whether fish were affected by cancer, it was a particularly interesting question to us, because they are a species far removed from the domestic animals. We shortly found that the fish were affected by cancer, and that those principally affected were in the domesticated state. Some three years ago our attention was called to the possibility of cancer in hatcheries, and our first observations were made in the State of New York, where, in a certain hatchery, in due course of time, an epidemic of cancer of the thyroid gland appeared, and in one summer 3,500 fish died with cancer, and in the following summer some 3,000 fish died, and that practically depopulated that hatchery.

We had never seen anything equaling the epidemic features of this disease. The thyroid gland, which is a gland situated in the neck, has a very intimate relationship with water. It is a gland which, in some countries, is very widely affected. An enlargement of the thyroid gland is, perhaps as you know, called goiter, goiter being an enlargement of the thyroid gland. In Switzerland and in the mountainous regions of eastern Europe goiter has arrived at a degree of economic importance which is quite serious. In Switzerland they refuse every year 7 per cent of the recruits for the Swiss Army because of goiter. There are districts in Switzerland in which as high as 70 per cent of all the young people have affections of the thyroid gland, and it is now firmly established that goiter is a disease resulting from the use of water from certain sources. It has long been known that there are goiterous wells, goiterous springs, and goiterous streams.

When this fact was properly recognized, in the eighties, a certain district in Switzerland, known as the Aarau district, changed its water supply, secured a water supply from a district which was free from goiter, and in the course of about 11 years the subsidence of goiter in that district fell from 59 per cent to less than 2½ per cent. It has recently been demonstrated that goiter can be given to animals by taking the water from certain localities and certain wells and giving them exclusively that water, taking other animals and giving them water from other sources as a control. Furthermore, it has been found that if the water is boiled it destroys the activity of the water, and it has also been shown it can be filtered through a so-called germ-proof filter without eliminating the agent which produces goiter.

Cancer of the thyroid gland, it may be stated, always begins as goiter; that is, the greatest authority on the subject, Prof. Kocher told me in Paris this autumn that he had never seen a case of cancer of the thyroid that had not begun with goiter. It is an exceedingly suggestive thing that fish, which live in the water, should have the type of cancer which is associated with this gland, which, in itself, is subject to the disease resulting from the use of certain water supplies.

It is impossible to tell you to-day how widespread goiter is in this country, but it is certainly a disease which is widespread, and it is on the increase. We have to-day no proper statistics giving us any idea of the geographical distribution of goiter. The reason for that is that our Census Bureau deals with mortality statistics, and a great many cases of goiter recover, and so those statistics give no adequate idea. This much can be said: That goiter in this country is on the increase; all surgeons are agreed to that and with the fact of its distribution through water. I think the contemplation of the fact that fish are peculiarly susceptible to goiter and that type of goiter in fish breaks out in great epidemics and terminates in a large number of cases in cancer is a question of great importance so far as the study of cancer in human beings is concerned.

Dr. Smith was asked a question with regard to the relationship of cancer in animals to human beings; whether there was a direct connection between the two. I do not think that question can be answered until we have more thoroughly investigated the subject. It is a fact that the distribution of cancer in the United States is almost identical with the distribution of the class of fish with which we are dealing; in other words, these fish live in the region in which cancer is most prevalent. It is also a known fact in Switzerland that the distribution of goiter in human beings and the distribution in animals is practically identical.

It is just as possible that the fish have contracted the disease from the pollution of the streams by man as it is that the fish are a factor in the distribution of the disease. In all these districts where you have a relationship between the animal and the human you have a vicious cycle; one thing helps the other.

In the last decade cancer in the civilized world has increased the world over; in the civilized countries, where the statistics are available, not less than 20 per cent. In the State of New York, where we have accurate statistics and have studied the matter carefully, in the last 12 years cancer has increased 25 per cent in proportion to the population. During the same time tuberculosis has decreased 4 per cent. We have no cure for tuberculosis, but we do understand the nature of the disease; we contend against it, we educate the public, and we are putting up a general educational fight, and it is beginning to show itself in figures. But in cancer the medical profession has been divided as to its nature, and we do absolutely nothing. Proposals are made that we should combat cancer on the ground that it is an infectious disease, and that brings out criticism. Some say that is a foolish proposition.

It is my personal belief that cancer is an infectious disease, and I am not alone in so thinking. There is a mass of evidence pointing in that direction. Within the last few months a crucial experiment,



one which all investigators have been seeking to accomplish, has been successful in this country, and puts the corner stone in the structure. The experiment to which I refer was made by Dr. Peyton Rouse, of the Rockefeller Institute, who, by a fortunate combination of circumstances, has been able to separate a virus which, injected into animals, will produce cancer, and that virus passes through a so-called germ-proof filter. It therefore belongs to the class known as filterable viruses. You have yellow fever, you have foot-and-mouth disease, and pigeon pox, and a large group of so-called filterable diseases. In that stage, undoubtedly, the organism is so small it can not be seen with an ordinary microscope.

I have referred to these facts to indicate to you the progress of modern cancer research, so you may see the importance of this question. The artificial propagation of fish is a beneficent and proper function of this Government; no country in the world has done quite as much, perhaps, as the American Government, and its Bureau of Fisheries is a model for all the other countries, and the States of this country are actively engaged in the same thing. But our Government gives the Bureau of Fisheries but \$30,000 for all scientific work. I, myself, have, in Buffalo, an appropriation from the State of New York for the investigation of cancer alone of more than \$30,000. That is not the way the Government should proceed with practical problems of this sort. In distributing fish you may be distributing disease, and you can not carry on such activities as the Bureau of Fisheries is engaged in without considering the public hygiene; and the responsibility can not be shirked. It will be perfectly possible for them to produce sound and healthy fish, and to continue their activities in a proper way; but to do that they must have a laboratory for the investigation of fish diseases.

We have given a considerable part of our time and activities to this work, and have done all we possibly could. Last year the situation reached the point where our institution could not carry this burden, and, as it is partly a burden of the Government, I went to the President with the matter, and he sent a special message to Congress. I assure you it is a very important question, and it reaches far beyond the question of fish culture. There are many practical problems involved in this which the Bureau of Fisheries should take charge of. If the Government will establish this laboratory, it will have the cooperation of our institution; if it does not, we can no longer carry the burden of special researches for the benefit of fish culture. We are willing to do everything we can, and for two years we have given up a large part of our time and endeavor to this investigation.

Mr. GOULDEN. Can you tell us the origin of this cancerous substance in the waters, and what is a preventive for it?

Dr. GAYLORD. I haven't any idea.

Mr. GOULDEN. You do not know how it is produced in the water; you do not know how it gets there?

Dr. GAYLORD. Not at all.

Mr. GOULDEN. Is it only in polluted streams, or is it in pure mountain streams? Where do you find it?

Dr. GAYLORD. The distribution of cancer in this country is in mountains, well-wooded and well-watered regions, and it is quite as prevalent in the country as in the cities, and affects those engaged in outdoor work to a greater degree than indoor occupations.

Mr. GOULDEN. It seems to destroy the theory, then, that it is found only in polluted streams?

Dr. GAYLORD. I will not say that. It is a very difficult matter to say how much pollution it will take to start cancer in streams. There has been a report of a very striking occurrence in Norway, where a stonecutter, who was building a wall near a small stream had cancer of the rectum and defecated on the bank of the stream. In the following year a number of cases of cancer developed in houses adjacent to the stream farther down.

I can tell you of another instance reported at the International Cancer Congress by a prominent cancer investigator, Dr. Sticker, who was previously a great opponent of the virus theory. The story was something like this: A certain count in Wurttemberg and the countess, his wife, died of cancer, and the rumor came from the schloss that nearly everybody in that place died of cancer. It came to the ears of the German Kaiser, who has cancer in his family, and, being intensely interested, he detailed Dr. Sticker to go there and investigate. He went to this estate and found a small pond, about 1,000 feet long by 600 feet wide. On one side was the schloss, or villa; on the other side were the farm buildings, and around one end of it was a little village of retainers of the count, who lived there—the butcher, the baker, the shoemaker, and so on. In the last 10 years 20 people had died of cancer in that locality, including the count and countess. Eight of those people died of cancer of the stomach. He found two cases of cancer of the stomach at the time; one of them he did an autopsy on, and the other, a person in bad health, was found on examination to have a tumor of the pylorus. He found them pumping the water out of this pond into the castle, using it without filtration, and drinking it. The water from the stable yard, just across the pond, ran into it, and the water was quite foul. They also told him that the carp in that pond had tumors. He did not see any of these, but the fishermen described them so accurately that there was no doubt about it, and they were going to seine the pond to secure material for him. I only speak of that to show you something of the infectious nature of cancer.

There are towns in Europe where they have moats, where the concentration of cancer is very marked. These things are all subjects for accurate investigation. I think this year will mark a great stimulation to the investigation of cancer as a parasitic disease. The agencies engaged in the distribution of cancer, and why it is increasing, are yet to be determined. But certainly we can not ignore a factor such as this of cancer in fish.

Here is a map of New York, and you will see that one of the largest districts of concentration of cancer is in the Adirondacks.

Mr. GOULDEN. The Adirondacks should have the best and purest water.

Dr. GAYLORD. The streams in Switzerland that produce goiter are almost the best and clearest water, and the most pure from the usual standpoint. Here are some pictures of fish. Here is a cancerous whitefish living in Lake Cayuga, N. Y., 5 miles below where an epidemic broke out in a State hatchery. There is a fish living under conditions of wildness, you might say. Here are a large salmon and a small fingerling showing throat tumors.

Mr. HARDY. In other words, you think it is possible the fish hatcheries may distribute this disease all over the country?

Dr. GAYLORD. I think they ought to take every precaution to be sure they do not. We have succeeded in curing this by adding one to five million iodine and one to five million mercury, both of them antiseptics, and both those agents make tumors decrease in size. It would not be difficult to adapt our methods to fish culture. Fish culture will have to be modeled along those lines.

Mr. HARDY. Is not that a pretty good indication that this fish difficulty is not cancer? You can not cure cancer in the human being by a little application of iodine.

Dr. GAYLORD. No, sir; but cancer is surely curable. There were some cases of cancer reported cured by vaccination at the International Cancer Congress, in Paris, in October last. I will take pleasure in showing you a picture of the first case cured in this country by this method.

Mr. STURGISS. Have you, in any of the cases of curing, drawn any definite conclusions?

Dr. GAYLORD. I can only state that the first so-called alleged six cases of cure are based upon scientific research going back about 10 years, the application of methods which have cured, experimentally, inoculated animals. We are no longer searching in the dark. We are working on a scientific structure built on years of work.

Mr. HARDY. I saw a statement recently in a newspaper of some definite instance in which it was claimed that an absolute case of cancer had been thoroughly cured, but I do not recall the particulars.

Dr. GAYLORD. I will show you a photograph of that case. That case got into the newspapers about a week ago, unfortunately.

Mr. WILSON. That was one of your cases, was it not?

Dr. GAYLORD. Yes. That was the case we began treatment of last May. We have been working on vaccination since 1907.

Mr. STURGISS. What do you use—monkeys and guinea pigs?

Dr. GAYLORD. We use rats and mice. You have not heard of us through the antivivisectionists, because the ladies are not interested in rats and mice.

Mr. STURGISS. You are pretty adroit in that respect.

Mr. HARDY. If they serve the purpose just as well I wish you would use only rats and mice.

Dr. GAYLORD. The rats and mice have served an enormously important purpose.

Mr. GOULDEN. You are connected with the Buffalo Cancer Laboratory?

Dr. GAYLORD. I am director of the State cancer laboratory. That was the first institution established for the special laboratory study of cancer, and many other countries have followed.

Mr. HARDY. Did you tell what your treatment was?

Dr. GAYLORD. That boy was vaccinated with a vaccine made from rat cancer.

Mr. HARDY. In other words, you cure like with like?

Dr. GAYLORD. We discovered in 1907 that you could vaccinate animals in the presence of cancer and cause their cancers to go away.

Mr. STURGISS. Similia similibus curantur?

Dr. GAYLORD. No; in this case it is unlike curing like. Of course, if you carry that to its final conclusion like does cure like. If you recover from a disease the disease cures itself.

Mr. HARDY. Is it not, rather, on the principle that by the injection of this weakened form of the disease the system is able to resist that and strengthen itself?

Dr. GAYLORD. That is protective vaccination. This type of vaccination consists in bringing out the latent forces at a time when they can be available. The principal trouble with tuberculosis, and diseases of that sort, is that there is always evidence of antibodies in the blood, but they are not sufficient. If you can stimulate the resistive powers of the individual to rise up you can overcome the disease. You produce in the individual himself an antibody to overcome his disease.

Mr. HARDY. Is that along the line that Mithridates was said to have accustomed his body to poisonous substances?

Dr. GAYLORD. Exactly. That is active immunity.

The CHAIRMAN. We are very much obliged to you, Doctor, for your information.

(Thereupon, at 12 o'clock noon. the committee proceeded to other business.)

(The following extracts from the report of the Commissioner of Fisheries to the Secretary of Commerce and Labor for the fiscal year ended June 30, 1910, were submitted by Dr. Smith, the deputy and acting commissioner:)

#### STUDY OF FISH DISEASES.

During the fiscal year the bureau has continued cooperation with the New York State Cancer Laboratory in the investigation of thyroid tumor or cancer in domesticated fishes. An aquarium with two independent systems of closed-water circulation, with proper means of refrigeration, has been established for the observation of salmon and trout and experiments in inoculation and treatment. Investigation at various stations of the bureau and at other hatcheries have shown that the disease is even more widespread and general than was suspected. Considerable difficulty has been encountered in obtaining for purposes of experiment a sufficient number of fish above suspicion of infection, and it has been necessary in this effort to secure a quantity of wild trout from remote streams. Owing to the technical difficulties attending this work, which are equal to those retarding the advance of knowledge relating to the cause and nature of cancer in human beings, progress is made only by slow and painstaking steps and by the use of the most approved appliances and methods. For this reason it is highly important that the bureau should be provided with a well-equipped laboratory and experimental hatchery, not only for the purposes of the present investigation, but for the study of the many other diseases affecting fishes, both under domestication and in a state of nature. The President, in a special message to Congress dated April 9, 1910, urgently recommended an appropriation for this purpose.

During the year the bureau was called on to investigate epidemics among hatchery fish at Spruce Creek, Pa., and Roxbury, Vt. At the former place the mortality was due in part to the thyroid tumor or cancer before alluded to, but the majority of the deaths were apparently caused by a bacterial infection which the bureau has found at other places, but which it has not the facilities to study at present. At Roxbury the disease is also infectious and annually causes large losses. The bureau has likewise made investigations in Pennsylvania, Ohio, and West Virginia upon the kindred subject of the pollution of streams in its relation to fishes and the fisheries.

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#### LABORATORY FOR THE STUDY OF FISH DISEASES.

There is again urged the importance of a station for the study of fish diseases and experiments in the interests of fish culture. In some of the hatcheries of the bureau and in similar establishments under State and private auspices certain fish diseases have become so prevalent as to make it a matter of grave

consideration whether the propagation of certain species, especially the trouts, should not be abandoned. It frequently occurs that the fish and fry are decimated by epidemics for which there are no known remedies, in consequence of which there are annually entailed on fish culture large wastes of time and money. In addition to the financial loss, embarrassment arises at times in filling legitimate demands for fish for restocking depleted waters, and the effect on the morale of the employees of the bureau who have to struggle hopelessly against an obscure disease is not unworthy of consideration. The gravest phase of the matter, however, is the possible relationship of some of these diseases to more or less kindred affections occurring in human beings. It has been determined that a type of cancerous affection is of widespread distribution among domesticated trout and their offspring planted in the streams. Whether this disease has a causal relation to cancer in human beings, or whether the two are to be even traced to the same source, is a matter of doubt, but the annually increasing mortality from cancer in man and certain remarkable coincidences in the geographical distribution of the disease in man and fish render it imperative that it should be made the subject of minute inquiry. The matter therefore has not only economic but humanitarian aspects, and the consideration of the serious character of the latter prompted the President to submit to Congress on April 9, 1910, a special message advocating an appropriation of \$50,000 for the construction and equipment of a laboratory adequate to enable the bureau to discharge its plain obligations. The bureau in the meantime is proceeding in the investigation to the limit of its powers, but it may be stated emphatically that it can make but little progress without the special facilities asked for.





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